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(21) International Application Number: PCT/US89/04834 (22) International Filing Date: 27 October 1989 (27.10.89) (30) Priority data: 267,540 4 November 1988 (04.11.88) US (71) Applicant: WM. WRIGLEY JR. COMPANY [US/US]; 410 North Michigan Avenue, Chicago, IL 60611 (US). (72) Inventors: CHAPDELAINE, Albert, H. ; 1593 Marquette Avenue, Naperville, IL 60565 (US). BARRETT, Kevin, F. ; 7202 Western Avenue, Darien, IL 60559 (US). REED, Michael, A. ; 630 Mulford, Evanston, IL 60202 (US). (74) Agent: FILARSKI, Thomas, J.; Willian Brinks Olds Hofer Gilson & Lione, Suite 3600, NBC Tower, 455 North Cit- yfront Plaza Drive, Chicago, IL 60611-5599 (US).		(81) Designated States: AT (European patent), AU, BE (Euro- pean patent), CH (European patent), DE (European pa- tent), FI, FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent). Published <i>With international search report.</i>
(54) Title: EMULSIFIERS FOR FLAVOR PROLONGATION IN CHEWING GUM (57) Abstract A chewing gum having prolonged flavor yield and better texture. The chewing gum contains a flavor enhancing amount and preferably from about 0.1 weight percent to about 0.7 weight percent of any emulsifier having Hydrophile-Lipophile Balance (HLB) value of greater than about 7.		

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EMULSIFIERS FOR FLAVOR
PROLONGATION IN CHEWING GUM

BACKGROUND OF THE INVENTION

The present invention relates to chewing gums yielding an extended flavor perception and better texture quality, and their method of manufacture.

To impart flavor to gum, the manufacturing process may utilize essential oils, synthetic flavors, or mixtures thereof including oils derived from plants and fruits, such as citrus oils, peppermint oil, spearmint oil, fruit essences, and the like. Unfortunately, flavor oils have a strong affinity for the chewing gum base causing the flavor oils to become inextricably bound within the gum base. Accordingly, the flavor oils do not completely release from the chewing gum base during chewing.

Chewing gums containing flavor oils which have reduced tendencies to bind with the chewing gum base would therefore constitute an advance in the art. Such chewing gums would be readily accepted by those skilled in the art and meet with commercial success.

It is therefore an object of the present invention to provide chewing gums containing flavor oils having improved flavor release characteristics.

This and other objects will become apparent to those skilled in the art in light of the following specification. It is to be understood, however, that the above-mentioned objectives are not to be considered a limitation of the present invention, the scope of which is delineated in the appended claims.

SUMMARY OF THE INVENTION

In accordance with the present invention, there is provided a chewing gum and a method of manufacturing a chewing gum comprising a flavor enhancing amount of emulsifier. The emulsifier has an HLB value greater than about 7 and preferably between about 10 and 14. The method comprises mixing a flavor enhancing amount of the contemplated emulsifier with other chewing gum ingredients.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

It has now been discovered that when emulsifiers of the type and quantity contemplated by the present invention are added to chewing gum ingredients, the chewing gum's flavor yield is prolonged. Other advantages contemplated by the present invention include a quicker flavor release. Also, when appropriate, the flavor quality of mint chewing gum is improved in that the "cooling" sensation associated with the mint flavor is increased. The chewing gum of the present invention also manifests improved texture quality. In particular, the gum is softer and maintains a larger cud size.

These and other advantages will become apparent in light of the following disclosure. It is to be understood, however, that the present invention is not intended to be limited by the advantages and embodiments discussed or contemplated. The appended claims and their equivalents have defined the scope of the invention.

In accordance with the present invention, the flavor enhancing emulsifiers contemplated are mixed into the chewing gum mass at any time during the manufacturing process. But it is preferred that the emulsifier be thoroughly mixed into the molten base early in the gum manufacturing process. Another preferred method is to premix the emulsifier into the flavor.

Emulsifiers contemplated by the present invention include certain modified phosphatide/phospholipid combinations such as modified lecithin; fatty acid esters of polyglycerol and other sucrose fatty acid esters, polysorbates, or similar compounds. The contemplated emulsifiers will have HLB values greater than about 7. Phosphatide/phospholipid emulsifiers typically have HLB values below 7. However, they can be modified for example by acetylation or hydroxylation to increase the HLB value. Two or more emulsifiers may also be blended to produce an emulsifier combination having its own HLB. Such combinations may include emulsifiers with HLB values less than 7 so long as the HLB of the combination is above 7. Preferably, the emulsifier added to the chewing gum ingredients will be determined by the flavor and base composition of the particular chewing gum.

The Hydrophile-Lipophile Balance (HLB) number is an expression of the emulsifiers hydrophilic-lipophile balance, i.e. the balance of the size and strength of the hydrophilic and the lipophilic groups of the emulsifier. The HLB system which has been known to those skilled in the art since the late 1940's is useful in choosing an appropriate emulsifier. In accordance with one embodiment of the present invention, emulsifiers with HLB values greater than about 7 are added to the chewing gum ingredients. The exact HLB value will depend on the flavor and base composition of the chewing gum. However, the emulsifiers used will have

an HLB value greater than about 7, preferably above 9 and most preferably above 12.

In accordance with the present invention, a flavor enhancing amount of emulsifier is added. Preferably, the quantity of emulsifier added to the chewing gum ingredients will range from about 0.1 weight percent to about 0.7 weight percent of the chewing gum. The exact quantity of the emulsifier added will depend on the chewing gum's particular flavor and base composition. Most preferably, the quantity of emulsifier added will be about 0.2 weight percent to about 0.3 weight percent of the chewing gum.

In general, a chewing gum composition comprises a water soluble bulk portion, a water insoluble chewable gum base portion, and, typically, water insoluble flavors. The water soluble portion dissipates with the portion of the flavor over a period of time during chewing. The gum base portion is retained in the mouth throughout the chew.

The insoluble gum base generally comprises elastomers, resins, fats and oils, waxes, softeners and inorganic fillers. Elastomers may include polyisobutylene, isobutylene-isoprene, copolymer, styrene butadiene rubber as well as natural latexes such as chicle. Resins include polyvinyl-acetate, estergums and terpene resins. Fats and oils may also be included in the gum including tallow, hydrogenated and partially hydrogenated vegetable oils and cocoa butter. Commonly employed waxes include paraffin, microcrystalline and natural waxes such as beeswax and carnauba and have melting points in the range of 110 to 180°F. The insoluble gum base constitutes between approximately 5 to 95 percent of the gum. Preferably the insoluble gum base comprises about 10 to approximately 50 weight percent of the gum and more preferably about 20 to approximately 30 weight percent.

The gum base typically also includes a filler component. The filler component such as calcium carbonate, magnesium carbonate, talc, dicalcium phosphate and the like. The filler may constitute between about 5 to approximately 60 weight percent of the gum. Preferably, the filler comprises about 5 to 50 weight percent of the chewing gum base. The gum base typically also contains softeners, including glycerol monostearate and glycerol triacetate. Further, gum bases may also contain optional ingredients such as antioxidants, colors and emulsifiers.

The water soluble portion of chewing gum may further comprise softeners, sweeteners and combinations thereof. The softeners are added to the chewing gum in order to optimize chewability and mouthfeel of the gum. Softeners, also known in the art as plasticizers or plasticizing agents, generally constitute between approximately 0.5 to approximately 15 weight percent of the chewing gum. Softeners contemplated by the present invention include glycerin, lecithin and combinations thereof. Further, aqueous sweetener solutions such as those containing sorbitol, hydrogenated starch hydrolysates, corn syrup and combinations thereof may be used as softeners and binding agents in gum.

Chewing gum may also contain high intensity sweeteners. Such sweeteners are also contemplated by the present invention for addition to the chewing gum. These sweeteners include both sugar and sugarless components. Sugar sweeteners generally include saccharide containing components commonly known in the chewing gum art which comprise but are not limited to sucrose, dextrose, maltose, dextrin, dried invert sugar, fructose, levulose, galactose, corn syrup solids, and the like, alone or in any combination. Sugarless sweeteners include components with sweetening characteristics but are devoid of the commonly known sugars and comprise

but are not limited to sugar alcohols such as sorbitol, mannitol, xylitol, hydrogenated starch hydrolysates, maltitol, and the like, alone or in any combination. Also contemplated for addition to the chewing gum are high intensity sweeteners such as aspartame, sucralose, acesulfame-K and saccharin.

Those skilled in the art will recognize that any combination of sugar and/or sugarless sweeteners may be incorporated into the chewing gum formula. Further, those skilled in the art will recognize a sweetener may be present in a chewing gum in whole or in part as a water soluble bulking agent. In addition, the softener may be combined with a sweetener such as an aqueous sweetener solution.

A flavor may be present in a chewing gum in an amount from approximately 0.1 to about 10 weight percent and preferably from about 0.5 to approximately 3.0 weight percent of the gum. Flavors contemplated by the present invention include any food acceptable liquid flavoring. The flavor may comprise essential oils, synthetic flavors, or mixtures thereof, including but not limited to oils derived from plants and fruits such as citrus oils, fruit essences, peppermint oil, spearmint oil, clove oil, oil of wintergreen, anise, and the like. Artificial flavoring components are also contemplated by the present invention. Those skilled in the art will recognize that the natural and artificial flavors may be combined in any manner. All such flavors and blends are contemplated by the present invention.

Additional ingredients such as colors and pharmaceutical agents may be added to the chewing gum.

In general, chewing gum is manufactured by sequentially adding the various chewing gum ingredients to any commercially available mixer known in the art. After the ingredients have been thoroughly mixed, the gum mass is discharged from the mixer and shaped into

the desired forms such as by rolling into sheets and cutting into sticks, extruding into chunks, or casting into pellets.

Generally, the ingredients are mixed by first melting the gum base and adding it to the running mixer. The base may also be melted in the mixer itself. Color may also be added at this time. A softener such as glycerin may then be added next along with syrup and a portion of bulking agent. Further portions of the bulking agents may be added to the mixer. It should be understood, that in proper conditions, the emulsifiers of the present invention may be added at any time during the gum manufacturing process. They may also be added to the gum base at any time prior to gum manufacture, particularly during base manufacture.

The entire mixing procedure typically takes from 5 to 15 minutes, but longer mixing times may sometimes be required. Those skilled in the art will recognize that variations to the above-described procedure may be employed. It is to be understood that an equivalent of changes and modifications of the embodiments described above are also contemplated by the present invention. The following examples are not to be construed as limitations upon the present invention, but are included merely as an illustration of various embodiments.

EXAMPLE 1

The chewing gum was prepared by adding molten base to a sigma blade mixer, then adding corn syrup and glycerin to the running mixer. Dextrose and sugar were added gradually with flavor addition occurring with the last of the sugar. All other examples were prepared in a similar manner. Where emulsifiers were used, they

were added to the molten base before the corn syrup and glycerin.

Chewing gum Sample 1 was prepared in accordance with the ingredients listed under "Sample 1" in Table 1.

Chewing gum Sample 2 was prepared in accordance with the ingredients listed under "Sample 2" in Table 1.

Chewing gum Sample 3 was prepared in accordance with the ingredients listed under "Sample 3" in Table 1.

In chewing tests comparing Sample 1 and Sample 2, Sample 2 was found to have a quicker flavor release and a slightly extended flavor duration.

In chewing tests comparing Sample 1 and Sample 3, Sample 3 was found to have an extended flavor duration as well as a greater flavor intensity.

TABLE 1

	<u>Sample 1</u>	<u>Sample 2</u>	<u>Sample 3</u>
Base	20.67	20.67	20.67
Sugar	53.18	53.005	53.005
Corn Syrup	14.59	14.59	14.59
Dextrose	10.14	10.14	10.14
Glycerin	0.86	0.86	0.86
Spearmint Oil	0.56	0.56	0.56
Santone 3-1-S (HLB 7) ¹	--	0.175	--
Santone 8-1-O (HLB 13) ²			<u>0.175</u>
	<u>100.00</u>	<u>100.00</u>	<u>100.00</u>

Santone emulsifiers are fatty acid esters of polyglycerol.

1. 3-1-S is Triglycerol Monostearate
2. 8-1-O is Octaglycerol Monoleate

EXAMPLE 2

Chewing gum Sample 4 was prepared in accordance with the ingredients listed under "Sample 4" in Table 2.

Chewing gum Sample 5 was prepared in accordance with the ingredients listed under "Sample 5" in Table 2.

In chewing tests Sample 4 was compared with Sample 5, Sample 5 was found to have longer lasting flavor yield as well as a greater maximum flavor duration and a slower flavor decline.

TABLE 2

	<u>Sample 4</u>	<u>Sample 5</u>
Base	19.30	19.30
Sugar	55.08	54.93
Corn Syrup	16.75	16.75
Dextrose	7.28	7.28
Glycerin	0.87	0.87
Natural & Artificial Flavor	0.72	0.72
Santone 8-1-0 (HLB 13)	--	0.15
	100.00	100.00

EXAMPLE 3

Chewing gum Sample 6 was prepared in accordance with the ingredients listed under Sample 6 in Table 3.

Chewing gum Sample 7 was prepared in accordance with the ingredients listed under Sample 7 in Table 3.

In chewing tests comparing Sample 6 and Sample 7, Sample 7 was found to have longer lasting flavor yield.

TABLE 3

	<u>Sample 6</u>	<u>Sample 7</u>
Base	19.30	19.30
Sugar	55.23	54.98
Corn Syrup	16.75	16.75
Dextrose	7.28	7.28
Glycerin	0.73	0.73
Natural & Artificial Fruit Flavor	0.71	0.71
Centromix CPS ¹ (HLB 12)	--	0.25
	100.00	100.00

1. Centromix is a blend of lecithin and polysorbate 80.

EXAMPLE 4

Chewing gum Sample 8 was prepared in accordance with the ingredients listed under Sample 8 in Table 4.

Chewing gum Sample 9 was prepared in accordance with the ingredients listed under Sample 9 in Table 4.

Chewing gum Sample 10 was prepared in accordance with the Ingredients listed under Sample 10 in Table 4.

In chewing tests Samples 8, 9 and Sample 10 were compared. Sample 9 was found to have a slightly reduced duration of flavor yield, and undesirable flavor attributes and mouth coating. Accordingly, Sample 9 is believed to have an excessive amount of this type of emulsifier for the particular chewing gum composition. Sample 10 had the quickest flavor release, the broadest flavor peak and greatest flavor intensity as well as the greatest flavor duration and the best flavor.

TABLE 4

	<u>Sample 8</u>	<u>Sample 9</u>	<u>Sample 10</u>
Base	20.18	20.18	20.18
Sugar	54.44	54.14	54.14
Corn Syrup	13.32	13.32	13.32
Dextrose	9.90	9.90	9.90
Glycerin	1.29	1.29	1.29
Peppermint Oil	0.87	0.87	0.87
Santone 3-1-S (HLB 7)	--	0.30	--
Santone 8-1-O (HLB 13)	<u>--</u>	<u>--</u>	<u>0.30</u>
	100.00	100.00	100.00

WE CLAIM:

1. A chewing gum comprising a chewing gum base, flavor and a flavor enhancing amount of emulsifier wherein said emulsifier has an HLB value greater than about 7.

2. The chewing gum of Claim 1 wherein said emulsifier is a sucrose fatty acid ester.

3. The chewing gum of Claim 1 wherein said emulsifier is a polysorbate.

4. The chewing gum of Claim 1 wherein said emulsifier is a modified phosphatide/phospholipid combination.

5. The chewing gum of Claim 1 wherein said emulsifier is a fatty acid ester of polyglycerol.

6. The chewing gum of Claim 1 wherein said emulsifier is modified lecithin.

7. The chewing gum of Claim 1 wherein said emulsifier comprises a combination of emulsifiers.

8. The chewing gum of Claim 1 comprising between about 0.1 weight percent and about 0.7 weight percent of emulsifier.

9. A chewing gum comprising a chewing gum base, flavor and a flavor enhancing amount of emulsifier wherein said emulsifier has an HLB value between about 10 and about 14.

10. The chewing gum of Claim 9 wherein said emulsifiers is a sucrose fatty acid ester.

11. The chewing gum of Claim 9 wherein said emulsifier is a polysorbate.

12. The chewing gum of Claim 9 wherein said emulsifier is a modified phosphatide/phospholipid combination.

13. The chewing gum of Claim 9 wherein said emulsifier is a fatty acid ester of polyglycerol.

14. The chewing gum of Claim 9 wherein said emulsifier is modified lecithin.

15. The chewing gum of Claim 9 wherein said emulsifier is a combination of emulsifiers.

16. The chewing gum of Claim 9 comprising between about 0.1 weight percent and about 0.7 weight percent of emulsifier.

17. A method of manufacturing chewing gum comprising mixing a chewing gum base, flavor and a flavor enhancing amount of emulsifier, said emulsifier having an HLB value greater than about 7.

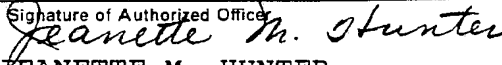
18. The method of Claim 17 wherein the emulsifier comprises between about 0.1 weight percent and about 0.7 weight percent of the chewing gum.

19. A method of manufacturing chewing gum comprising mixing a chewing gum base, flavor and a flavor enhancing amount of emulsifier, said emulsifier having an HLB value of about 10 to about 14.

20. The method of Claim 19 wherein the emulsifier comprises between about 0.1 weight percent and about 0.7 weight percent of the chewing gum.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US89/04834

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC		
IPC(5): A23G 3/30		
U.S.CL.: 426/3, 4, 5, 6; 424/48		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
U.S.	426/3, 4, 5, 6	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹		
Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
Y	U.S. A, 3,930,026 CLARK 30 December 1975 (Cols 1 and 2)	1-20
Y, P	U.S. A, 4,786,491 PATEL 22 November 1988 (Col 4, paragraph bridging cols 6 and 7)	1-20
A	U.S. A, 4,604,287 GLASS ET AL 05 August 1986	1-20
Y	JP A, 58-47480 ARIMA ET AL 19 March 1983 (Pages 2, 3 and 5)	1-20
Y	U.S. A, 4,157,402 OGAWA ET AL 05 June 1979 (Cols 2 and 3)	1-20
A	U.S. A, 4,379,169 REGGIO ET AL 05 April 1983	1-20
Y	U.S. A, 4,378,374 REGGIO ET AL 29 March 1983 (Cols 1 and 2)	1-20
Y	U.S. A, 4,752,481 DOKUZOVIC 21 June 1988 (Cols 2, 4, 5, 7 and 8)	1-20
A	U.S. A, 4,233,288 CORNELL 11 November 1980	1-20
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
11 January 1990		24 JAN 1990
International Searching Authority		Signature of Authorized Officer
ISA/US		 JEANETTE M. HUNTER